DIVISION OF BIOCHEMISTRY
DEPARTMENT OF BIOLOGY

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Dear Francis:

You will be interested to hear that the β-lactoglobulins are at last being fingerprinted, successfully. We have a visitor this month, Robert Townend, from Timasheff's laboratory in Philadelphia, who is mainly interested in the fascinating association properties of these proteins. Of course the work is still in its preliminary stages, but I am writing to tell you about it because you were always so insistent that it should be done.

Two different methods of splitting the disulphide bridges eventually lead to beautiful fingerprints and ionograms. It appears that the protein is made up of two identical subunits of 18,000; I think the X-rays showed that to be likely. An acidic trypticle of the β-A (fast) protein disappears and is replaced by two new trypticles in β-B. These are relatively faster and slower. Since there is supposed to be a charge difference of two per 36,000 this looks like a neutral to lysine change. If all goes well, the precise change but not the sequences, should be known soon. It is very nice to have this sort of thing happening outside the hemoglobins, though I gather that Chris Anfinsen has a definite peptide change for one of George's phage lysozyme mutants.

Mike Naughton has been busy separating human hemoglobin chains for his sequence work. He is currently developing a new method for finding the sequence of trypticles in a chain, which looks very promising indeed. Tony is making progress with hemoglobin A_2. All his four peptide changes are in the delta chain (Val-His-Leu-...). He is now quite sure that the first glutamic acid of peptide A-T-26 is replaced by alanine. I don't know whether he will have time to do the sequences of all four, before submitting his thesis in England this next

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Dr. Crick:

autumn. If all goes well, he plans to spend a couple of months in Italy collecting thalassemia blood samples, before returning to MIT for a year as instructor. He has been a great success here with everybody. I think a year's teaching experience will be useful to him. We are pressing on with the survey of normal hemoglobins and a search for non-electrophoretic mutations in thalassemia samples. So far, no news. Baglioni, from Cavalli-Sforza, who is doing this, is also studying a person with four hemoglobins, AGCX, where X is $\alpha_2^G\beta_2^C$.

I am busy on soluble RNA, yeast, where I enjoy greatly working with Ed Herbert. Most of my time has been spent on tooling up on the preparation and doing base compositions, particularly the nucleoside and the 3'-5' diphosphate end groups (roughly 1:70) and pseudo uridylic acid (nearly 4). I would like to try Geoffrey Brown's separation of specific RNA's and then do degradative studies - a modest aim! Am I right in thinking that you have left this problem? It is quite fun to learn nucleic acid chemistry. On the whole, I find MIT enjoyable and stimulating, as well as hectic.

It would be very nice to hear what you and Sidney are doing. We were all excited to see Max and John's papers in Nature. When will you be in the U. S.?

Best wishes to you and Odile, also to Max, John, Sidney, Mary, Leslie, etc.

Yours,

Vernon.

V. M. Ingram

VMI/dd